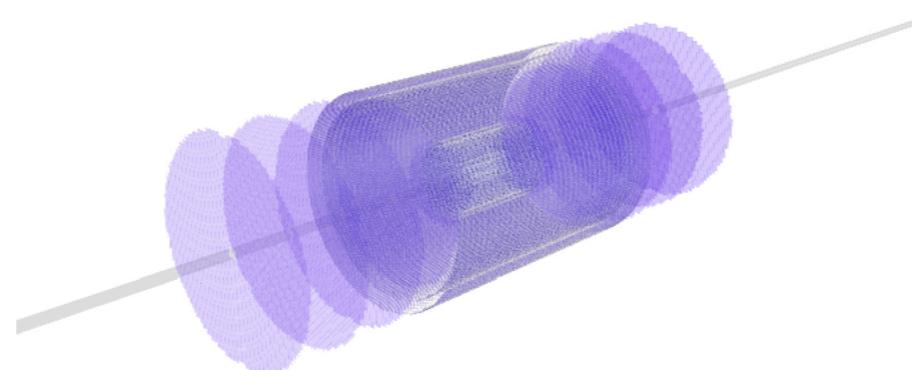


All-Si Tracker studies in Fun4All

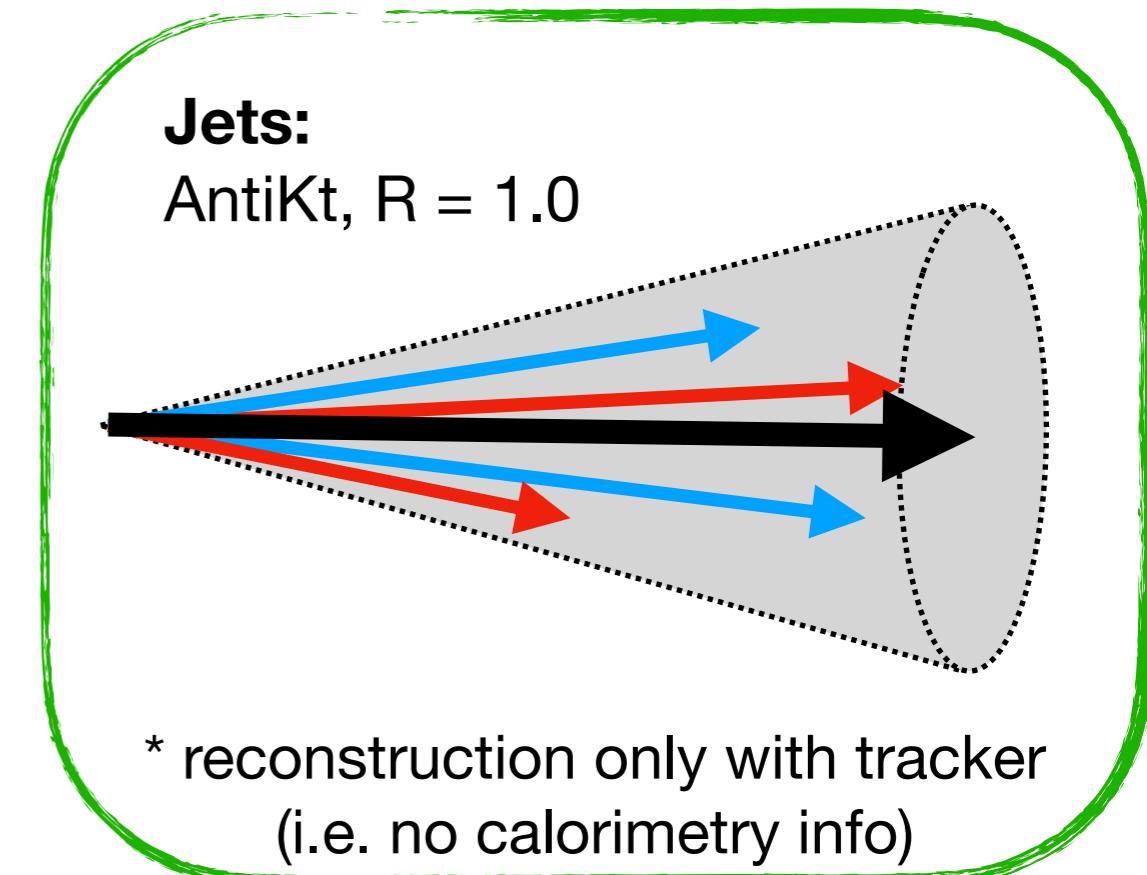
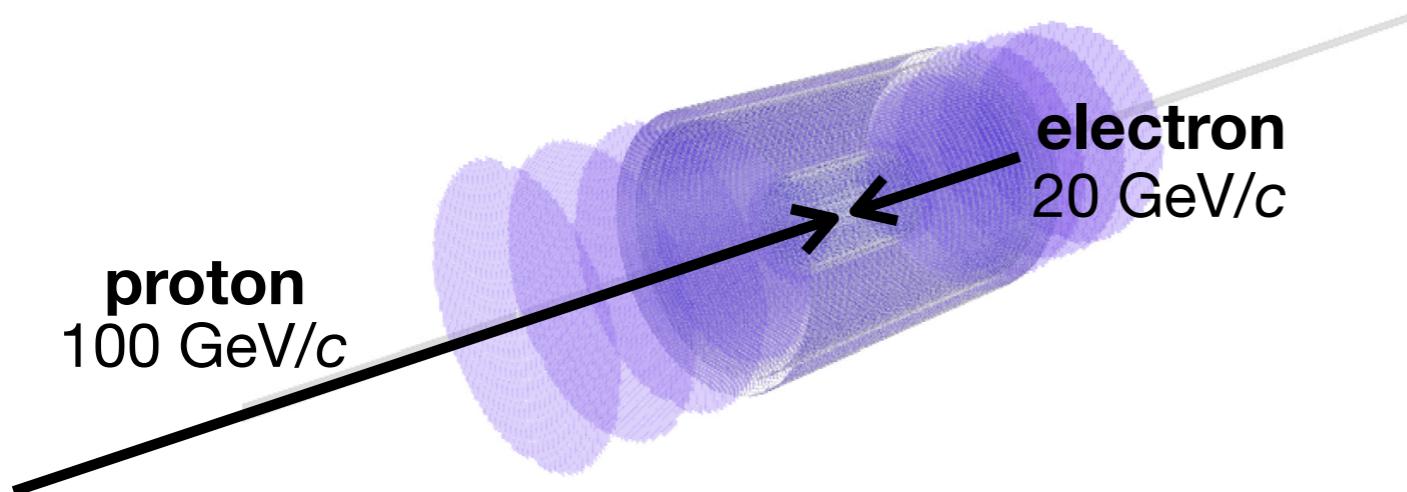


Rey Cruz-Torres
06/25/2020

Pythia 8 and jet configuration

- Back-to-back beams with different energies:

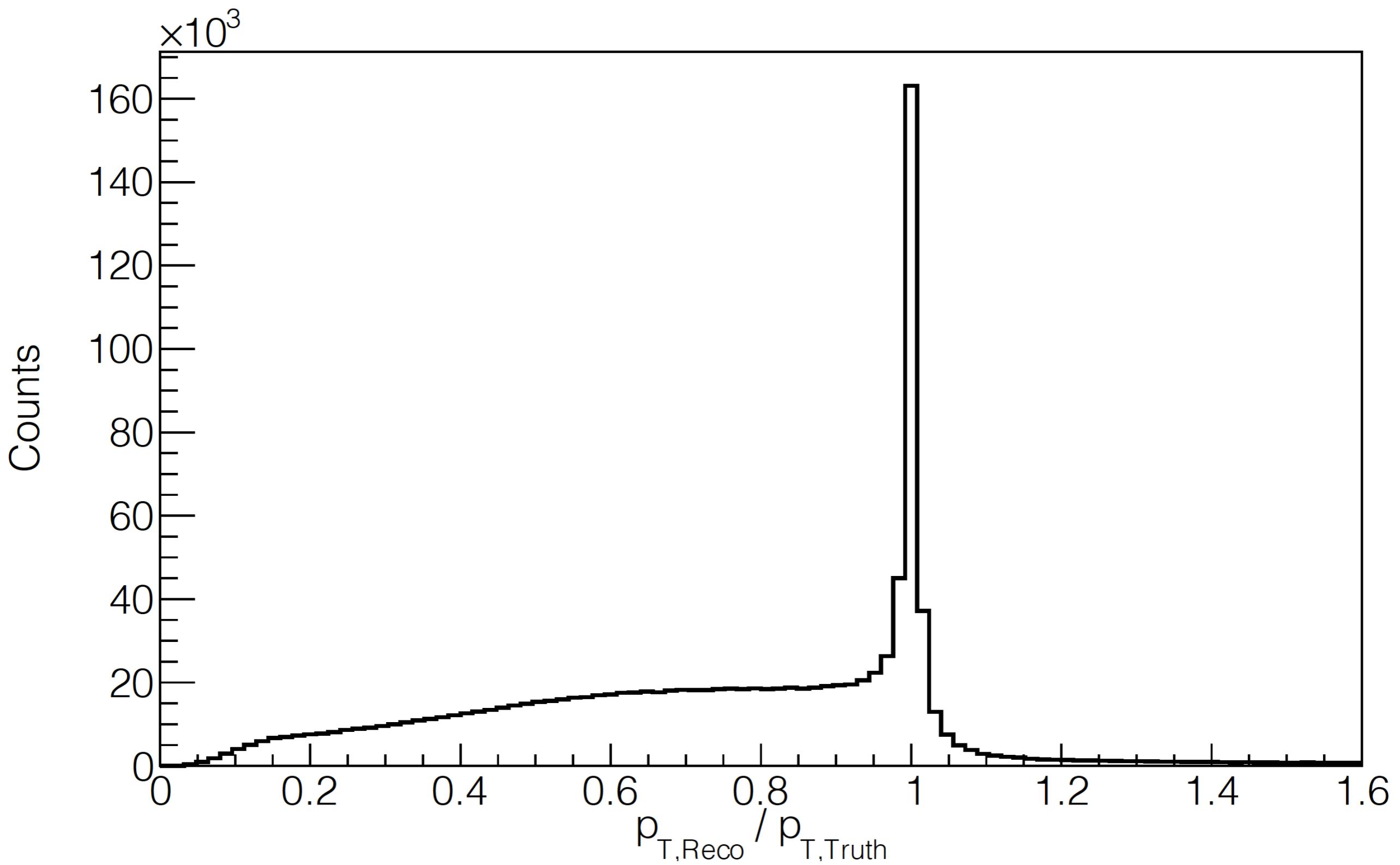
- Beams:frameType=2
- details [here](#).



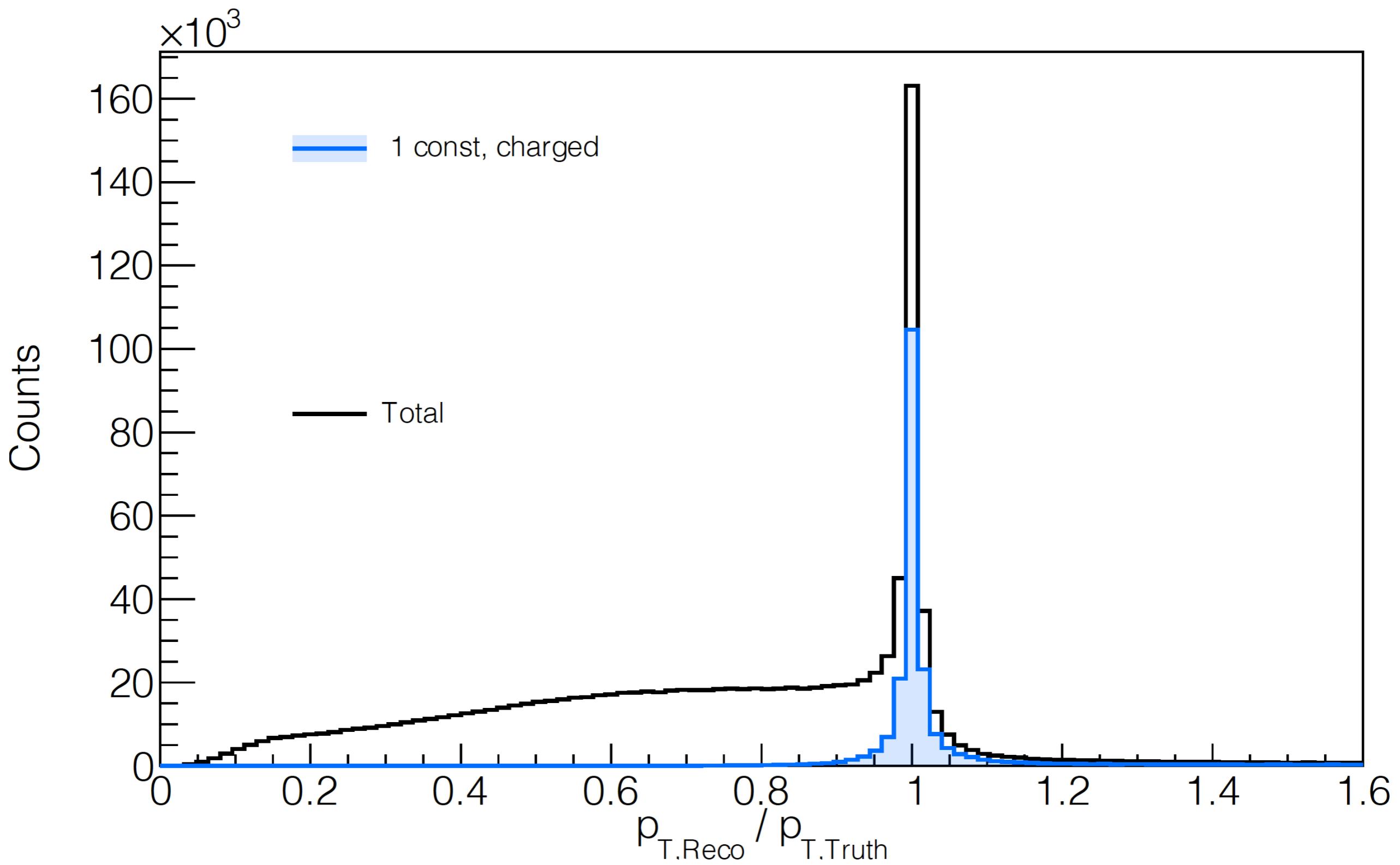
- Scattering $ff' \rightarrow ff'$ via γ^*/Z^0 t-channel exchange (full interference between the γ^* and γ^*Z^0):
 - WeakBosonExchange:ff2ff(t:gmZ) = on
 - details [here](#).
- All Hard QCD processes on:
 - HardQCD:all = on
 - details [here](#).

$$Q^2 > 16 \text{ (GeV/c}^2\text{)}^2$$

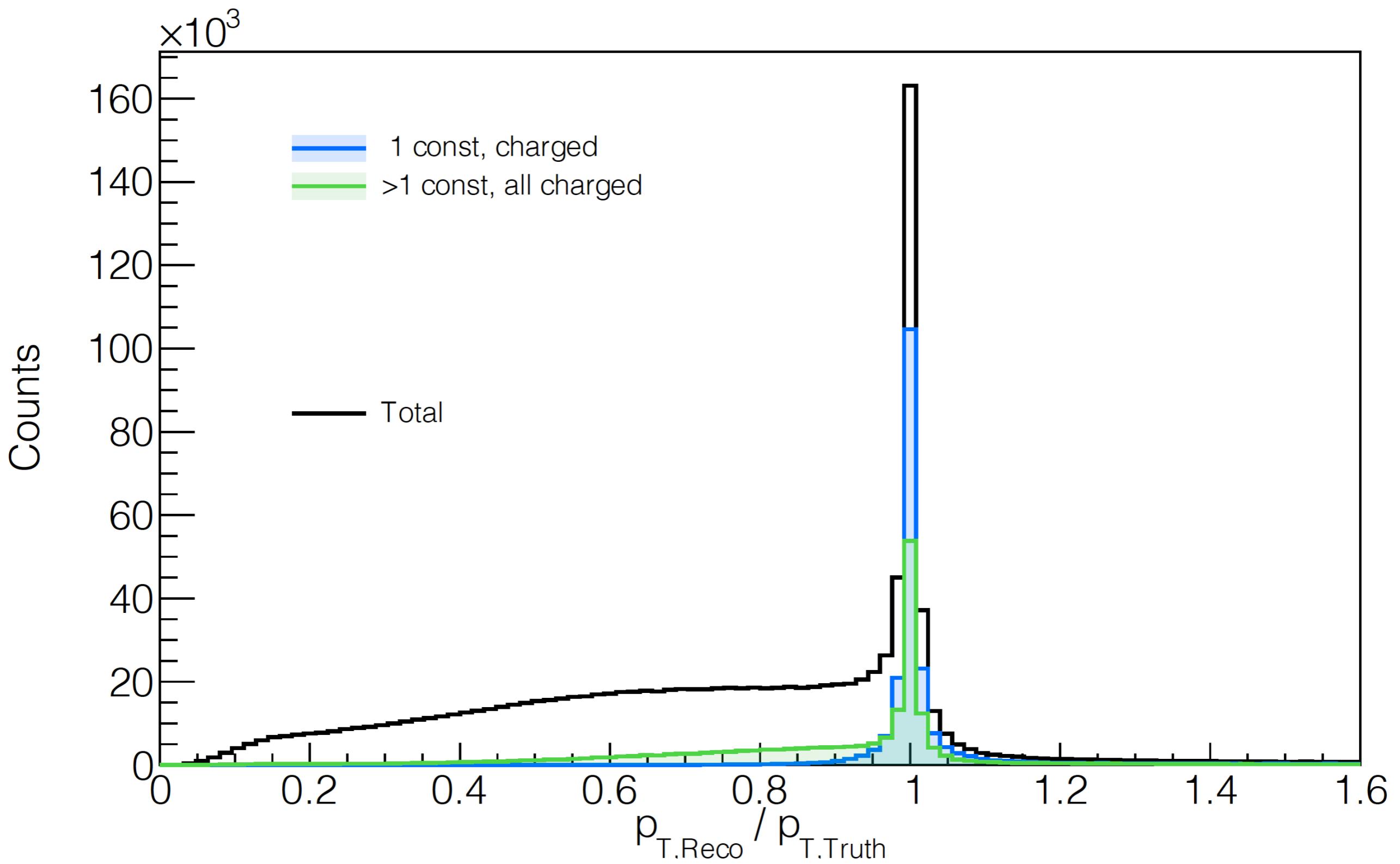
Jet $p_{\text{T}, \text{Reco}} / p_{\text{T}, \text{Truth}}$ distribution



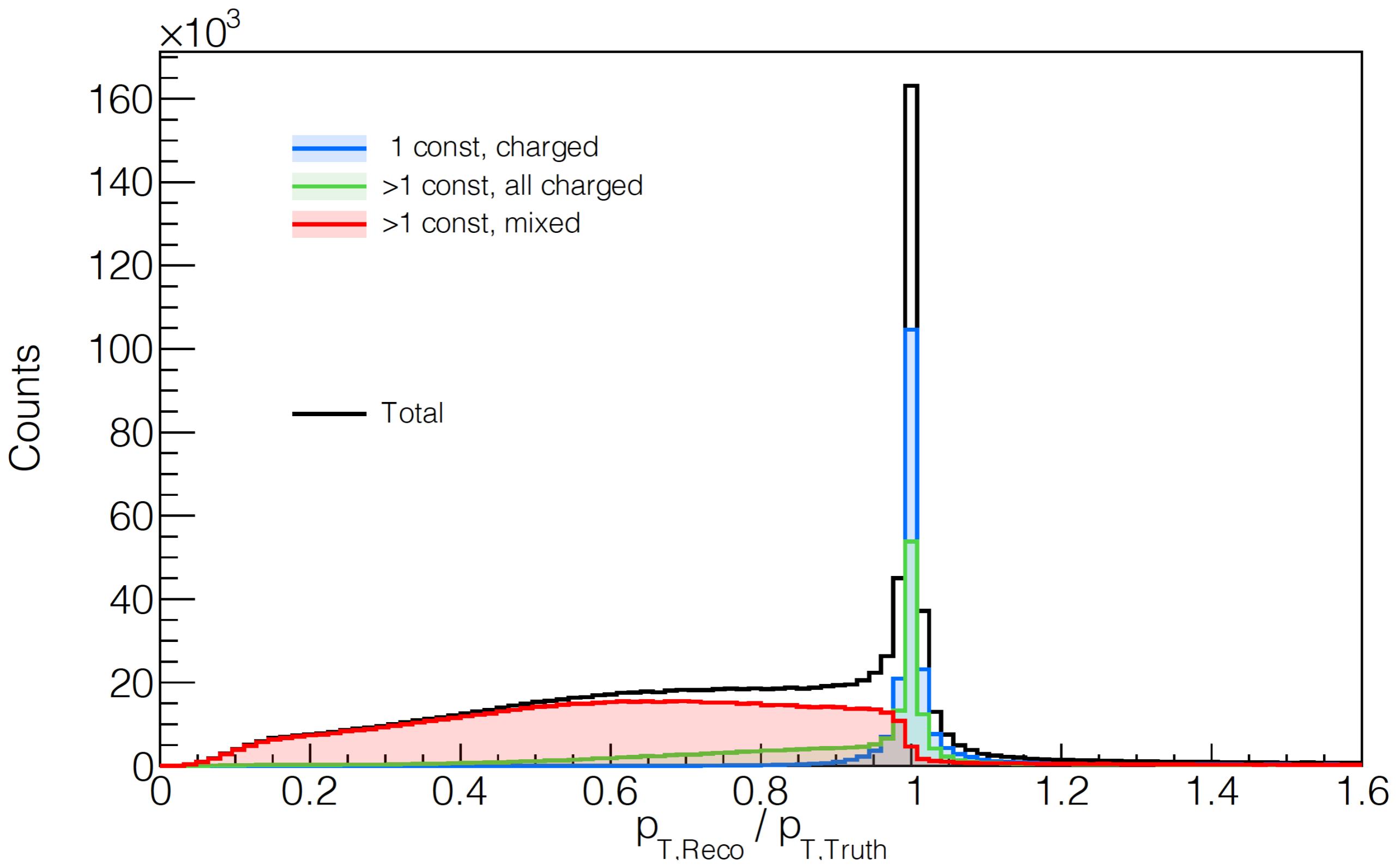
Jet $p_{\text{T}, \text{Reco}} / p_{\text{T}, \text{Truth}}$ distribution



Jet $p_{\text{T}, \text{Reco}} / p_{\text{T}, \text{Truth}}$ distribution



Jet $p_{\text{T}, \text{Reco}} / p_{\text{T}, \text{Truth}}$ distribution

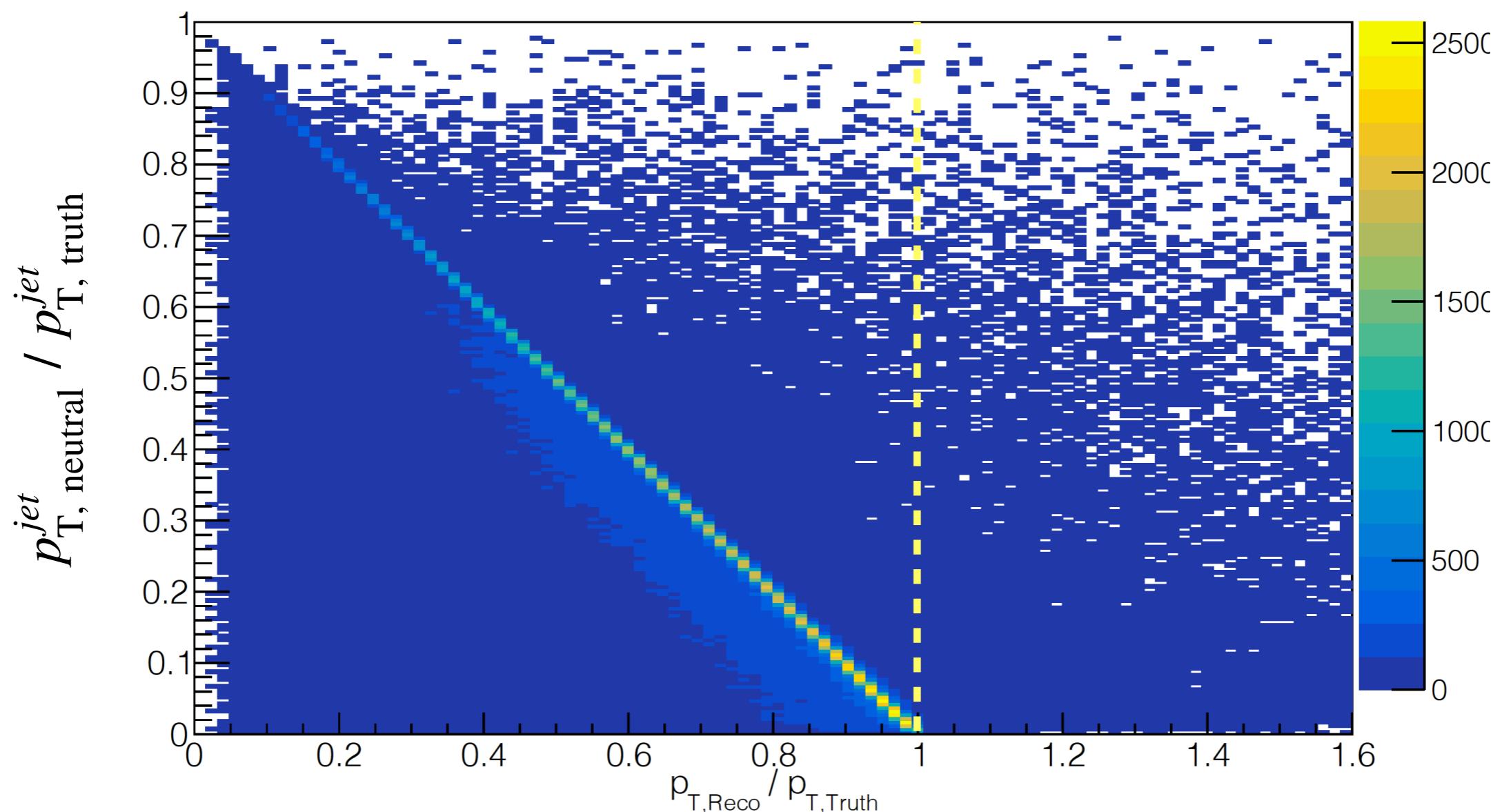


Jet p_T fraction carried by neutrals

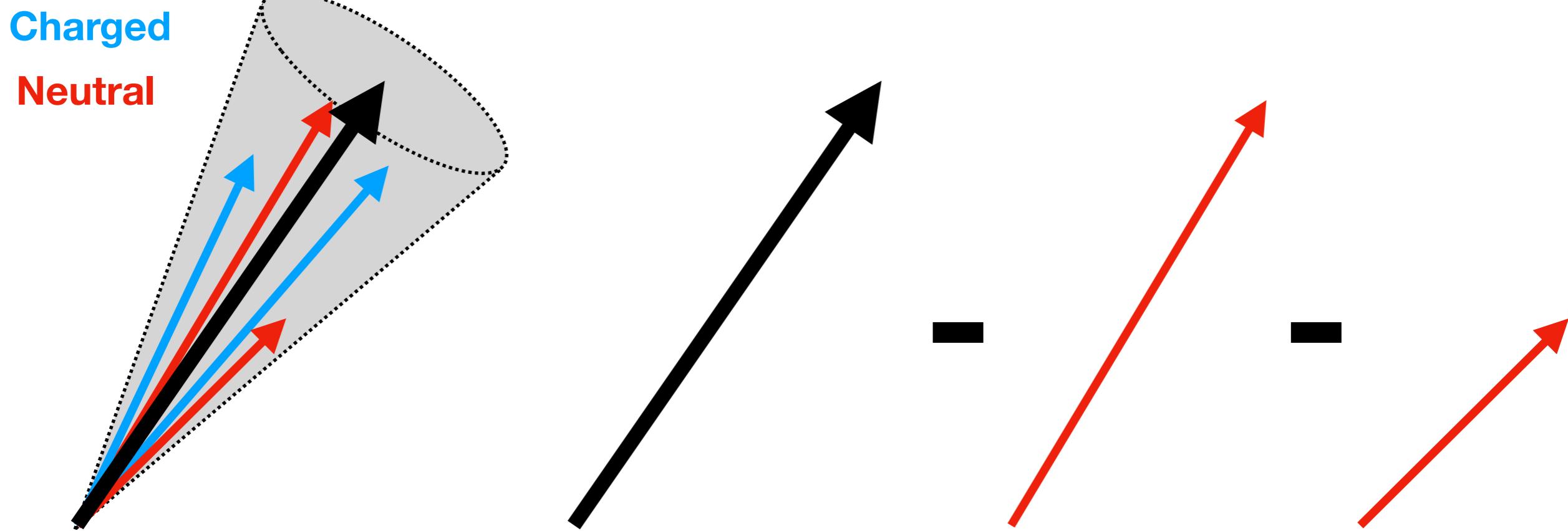
$$p_{\text{truth}}^{jet, \mu} = p_{\text{charged}}^{jet, \mu} + p_{\text{neutral}}^{jet, \mu}$$

Sum of charged constituent 4-momenta Sum of neutral constituent 4-momenta

>1 constituent, mixed jet



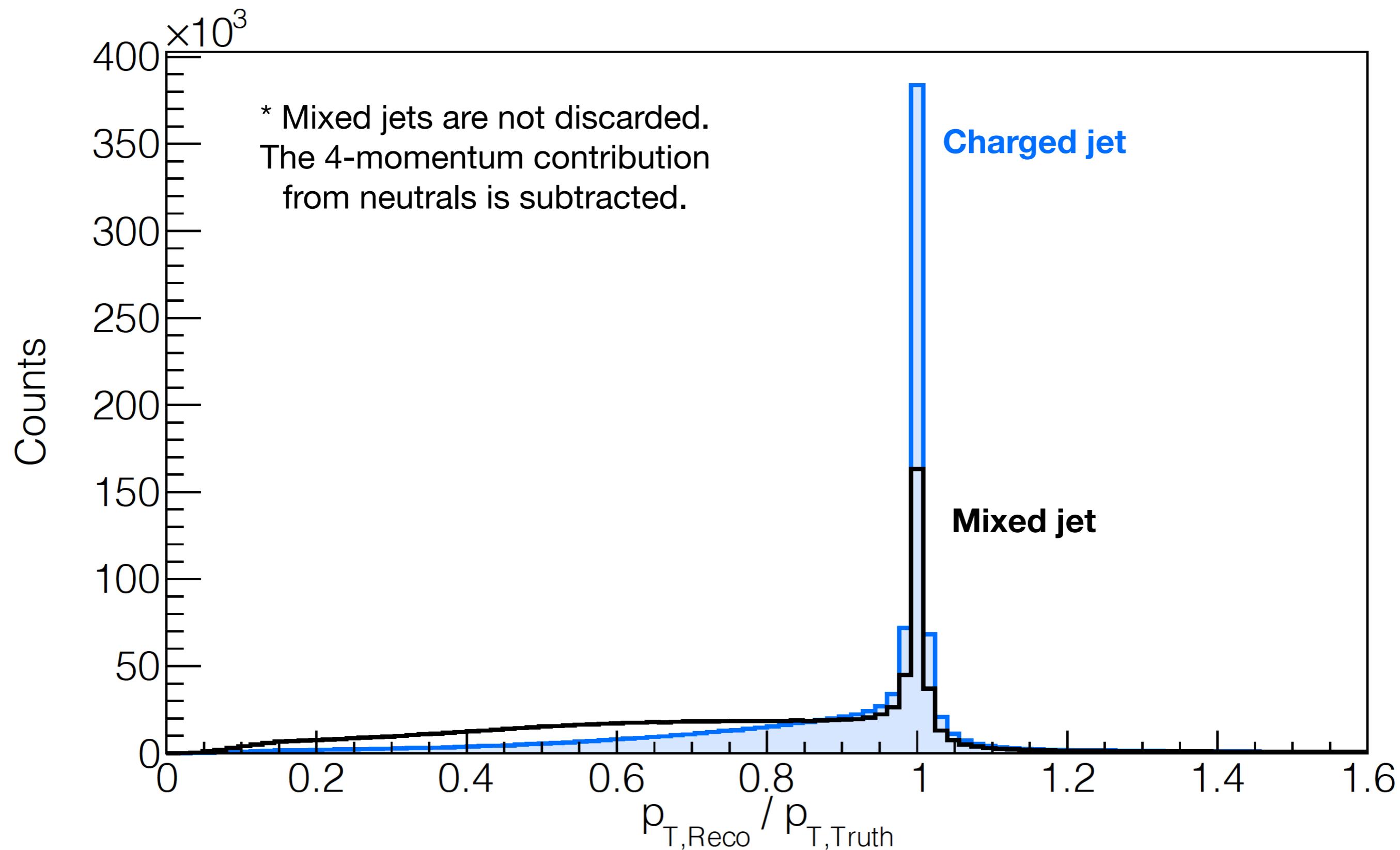
Subtracting neutral contribution from truth jet



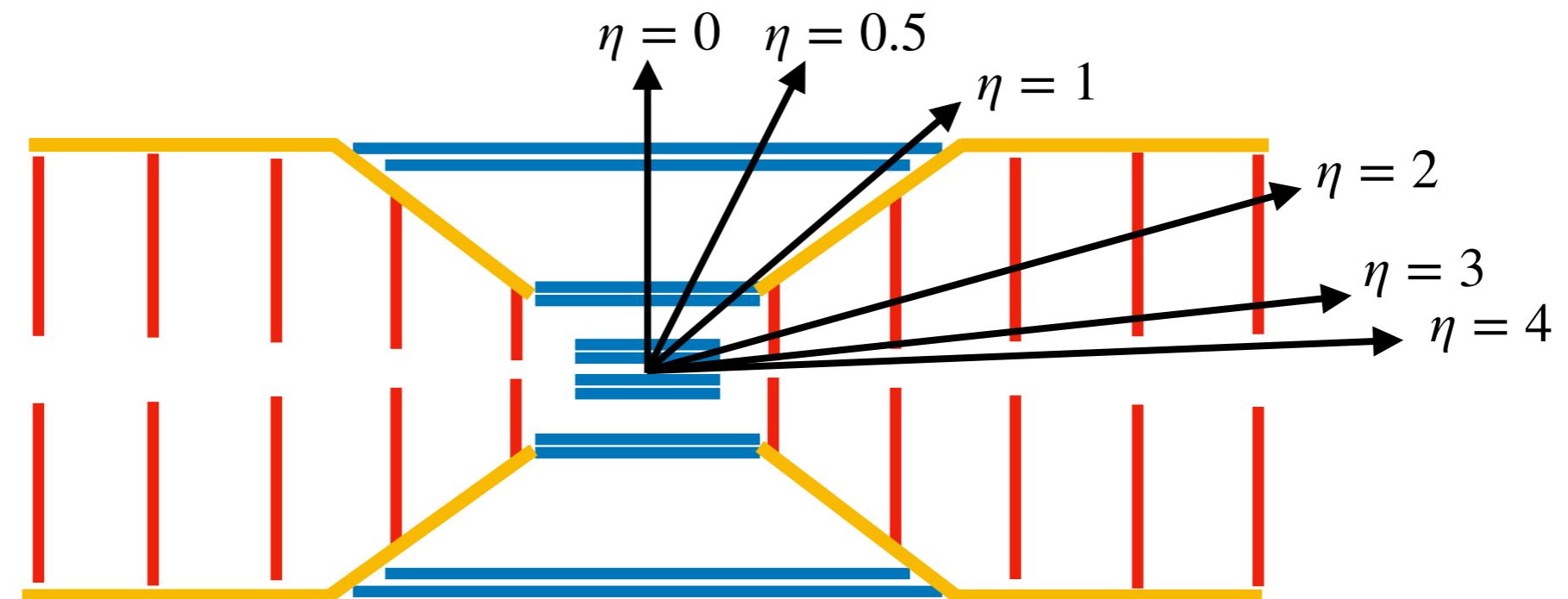
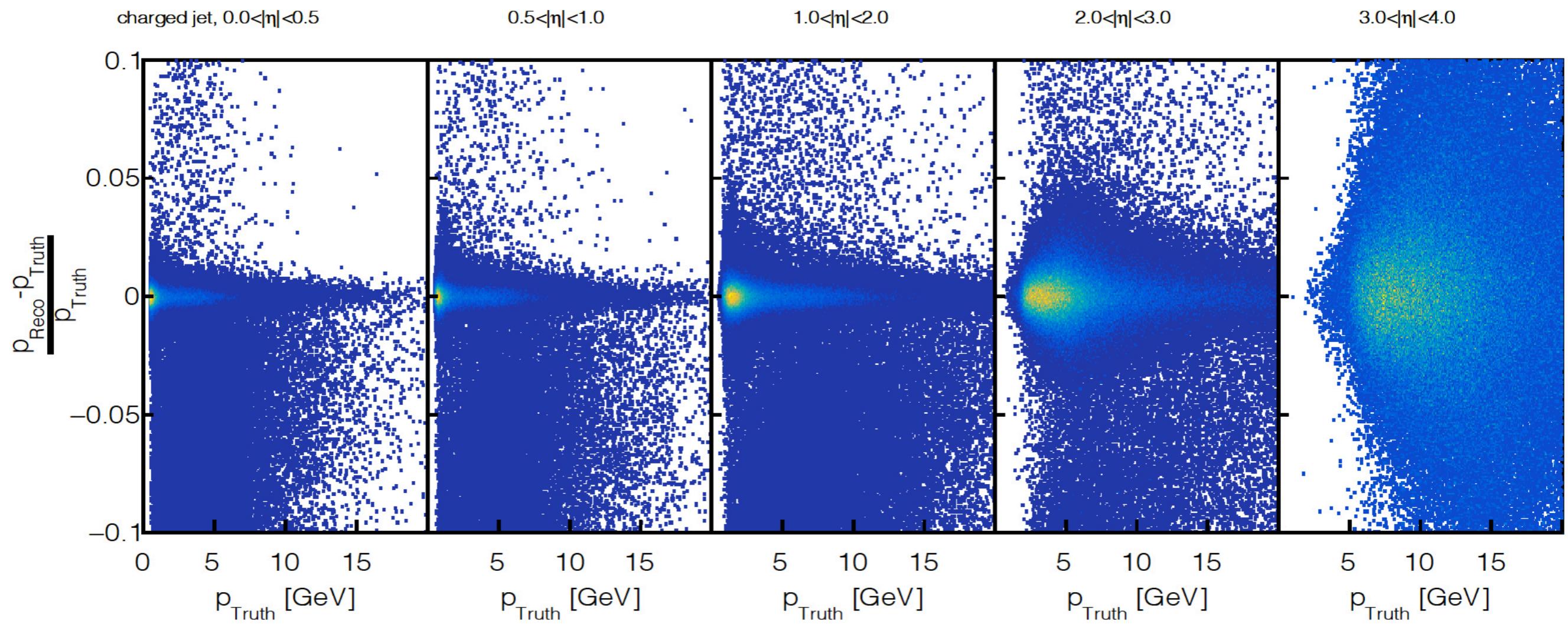
```
for ( each truth_jet ){  
    neutral_truth_jet = truth_jet  
    for ( constituent in truth_jet ){  
        if( constituent is neutral )  
            neutral_truth_jet -= constituent  
    }  
}
```

* green in this slide indicates a four-momentum vector

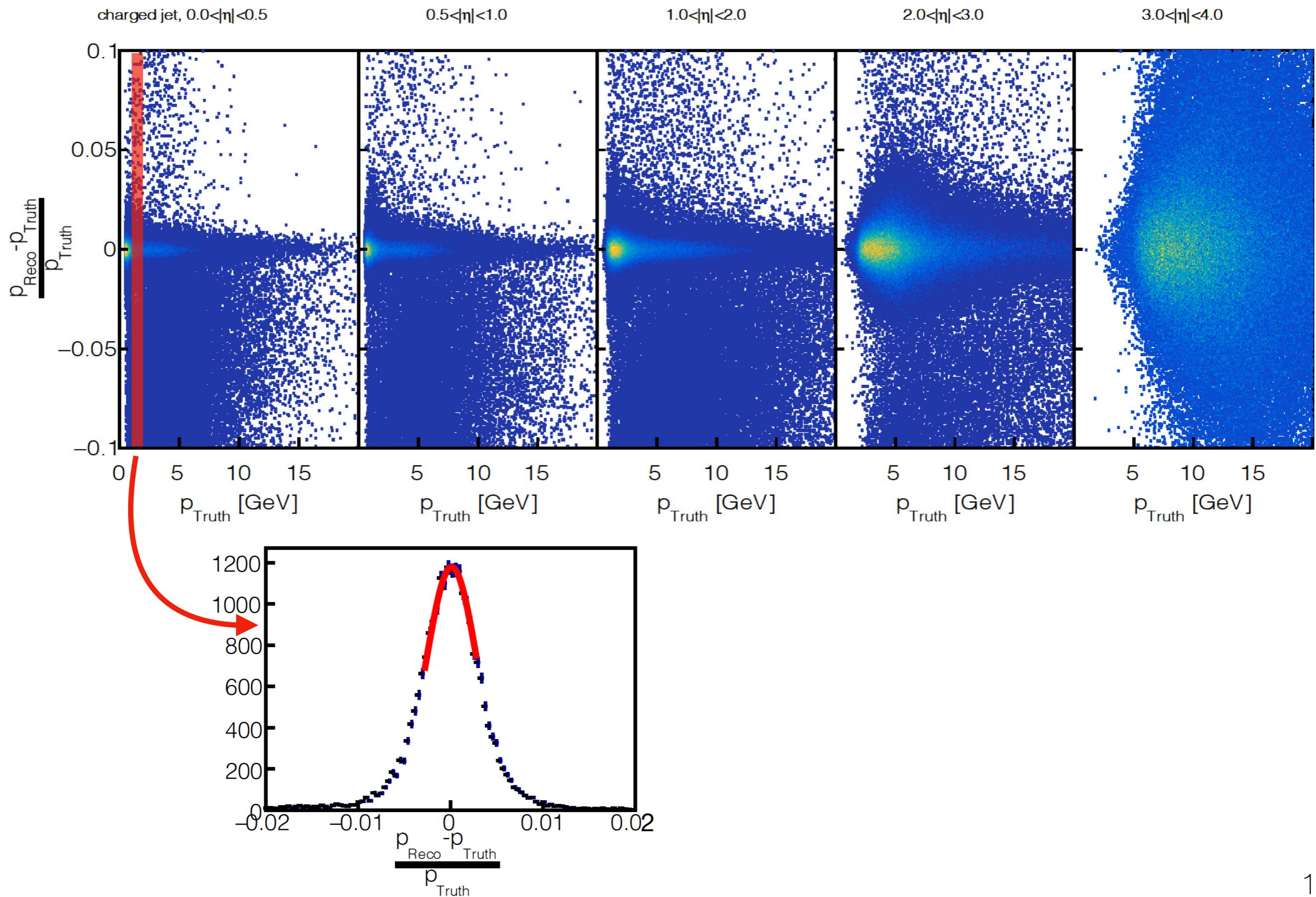
$p_{\text{T, Reco}} / p_{\text{T, Truth}}$ dist. after neutral subtraction



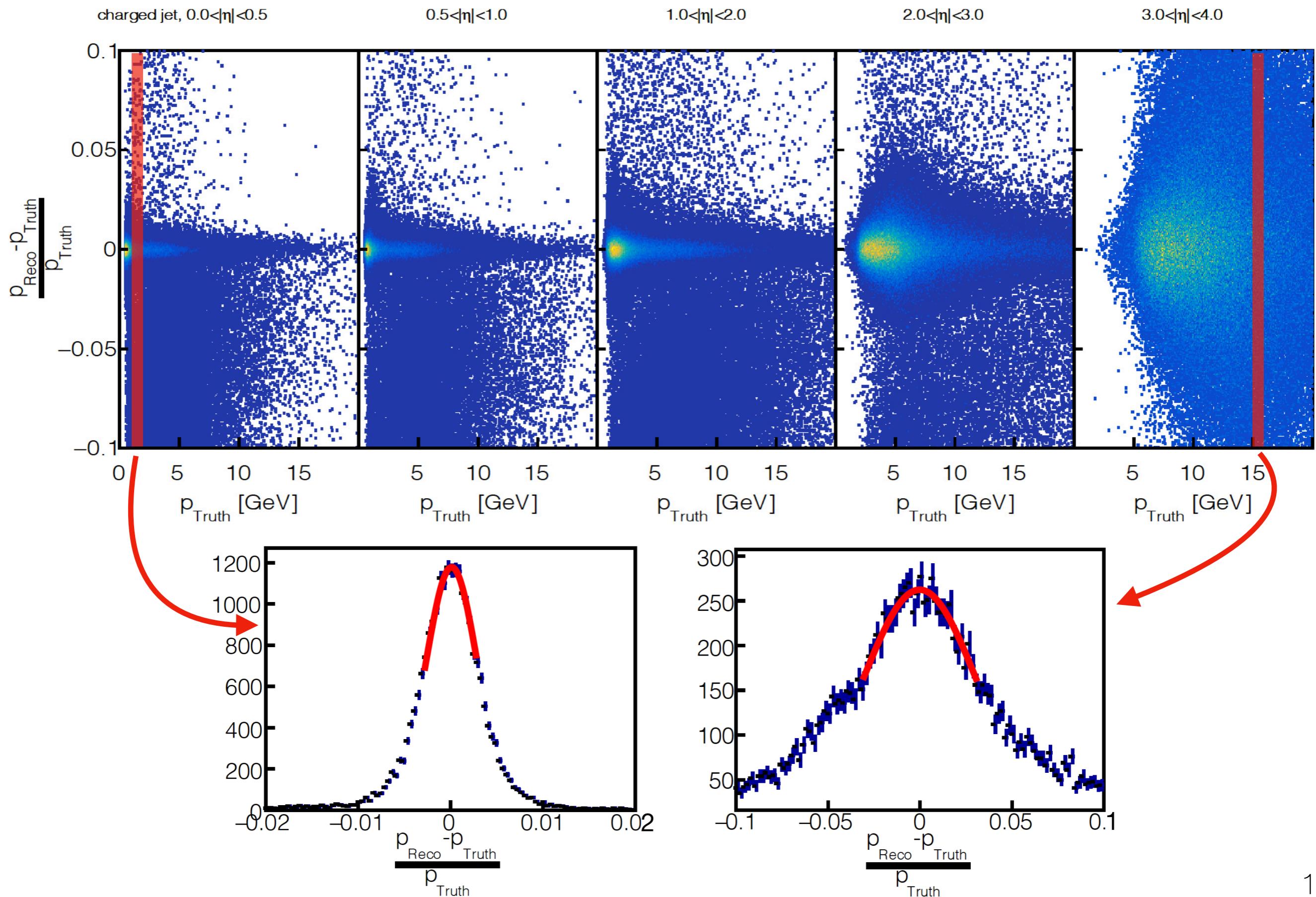
Jet momentum resolution



Jet momentum resolution

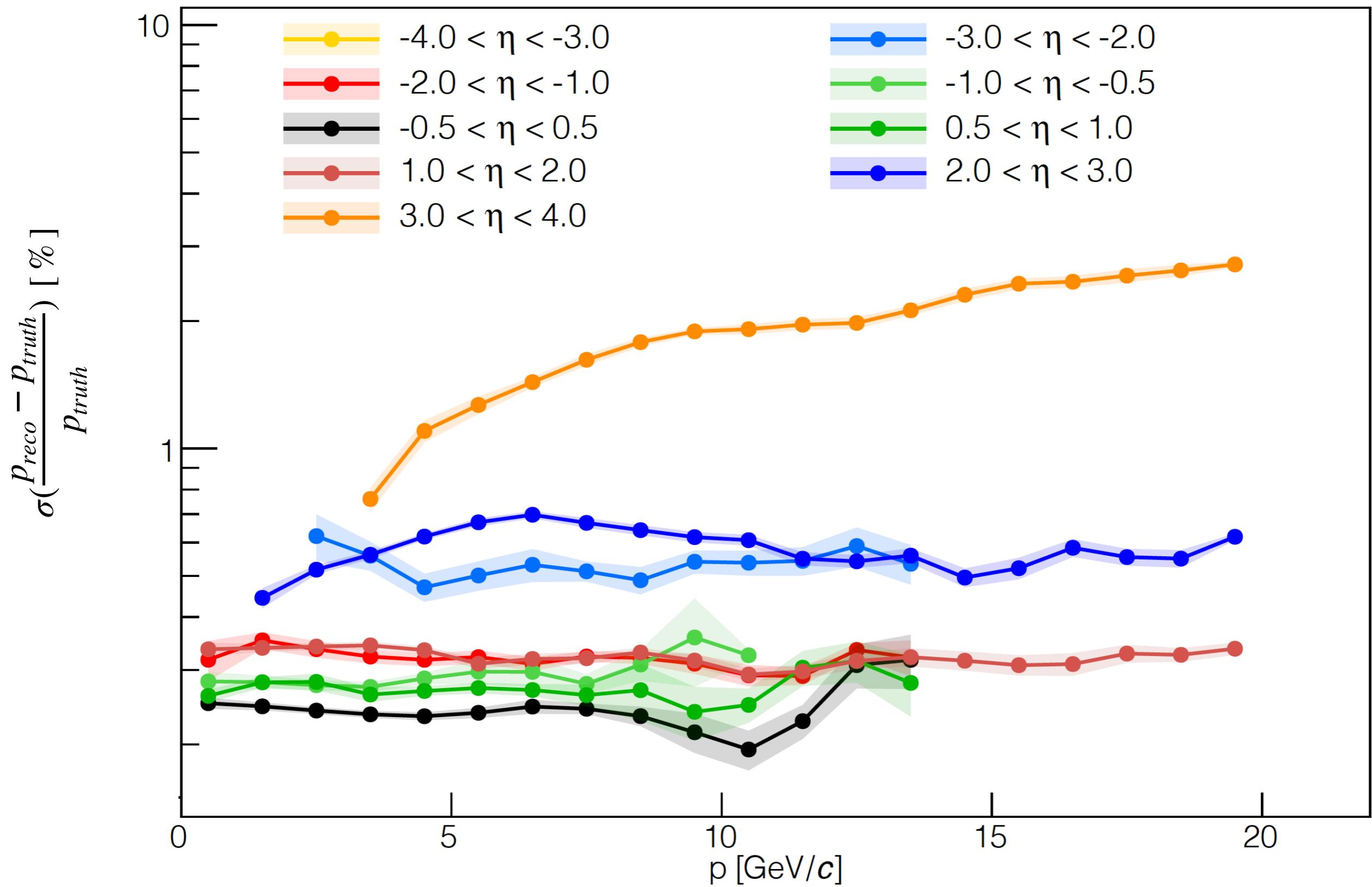


Jet momentum resolution



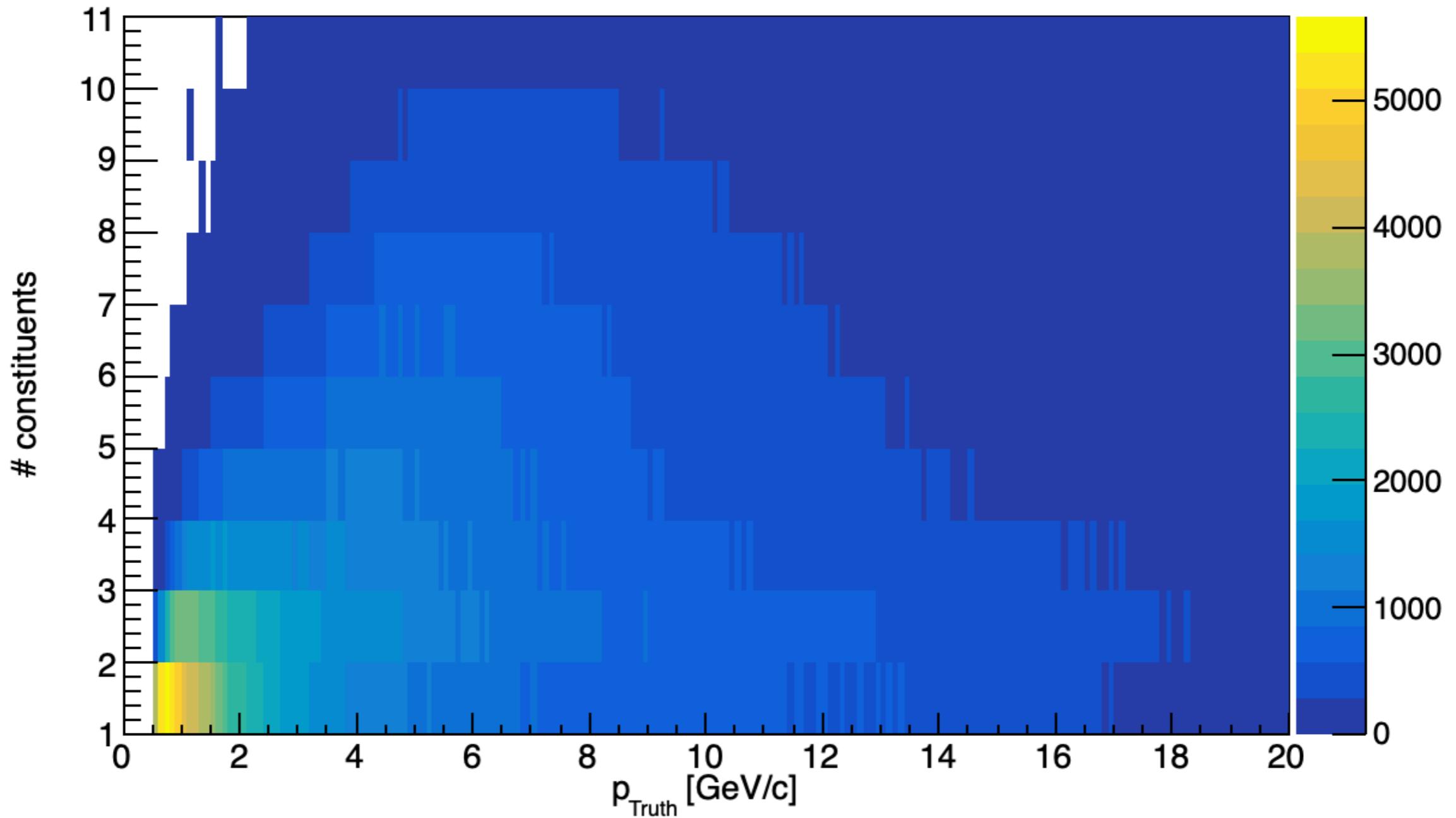
Jet momentum resolution

B = 3.0 T



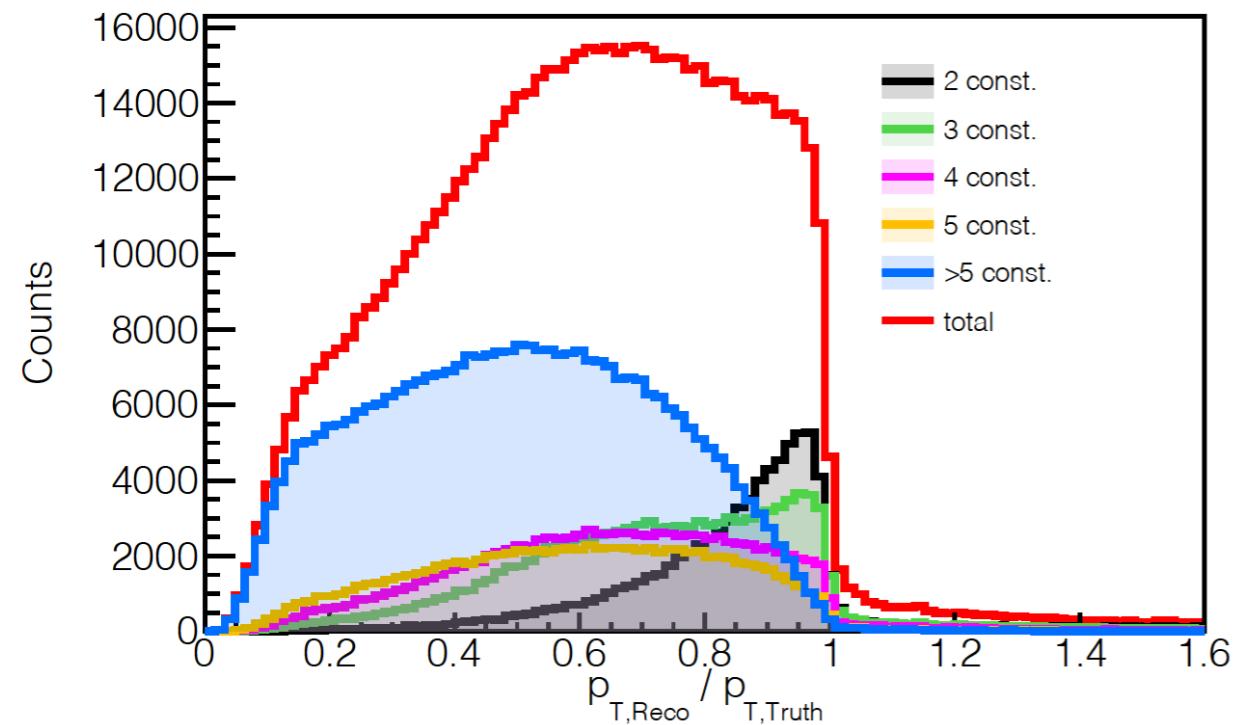
Next Steps:

- Repeat study with other B-field configurations
- Study angular resolutions
- Access constituents info
- Look as smaller-radii jets
- Efficiency studies

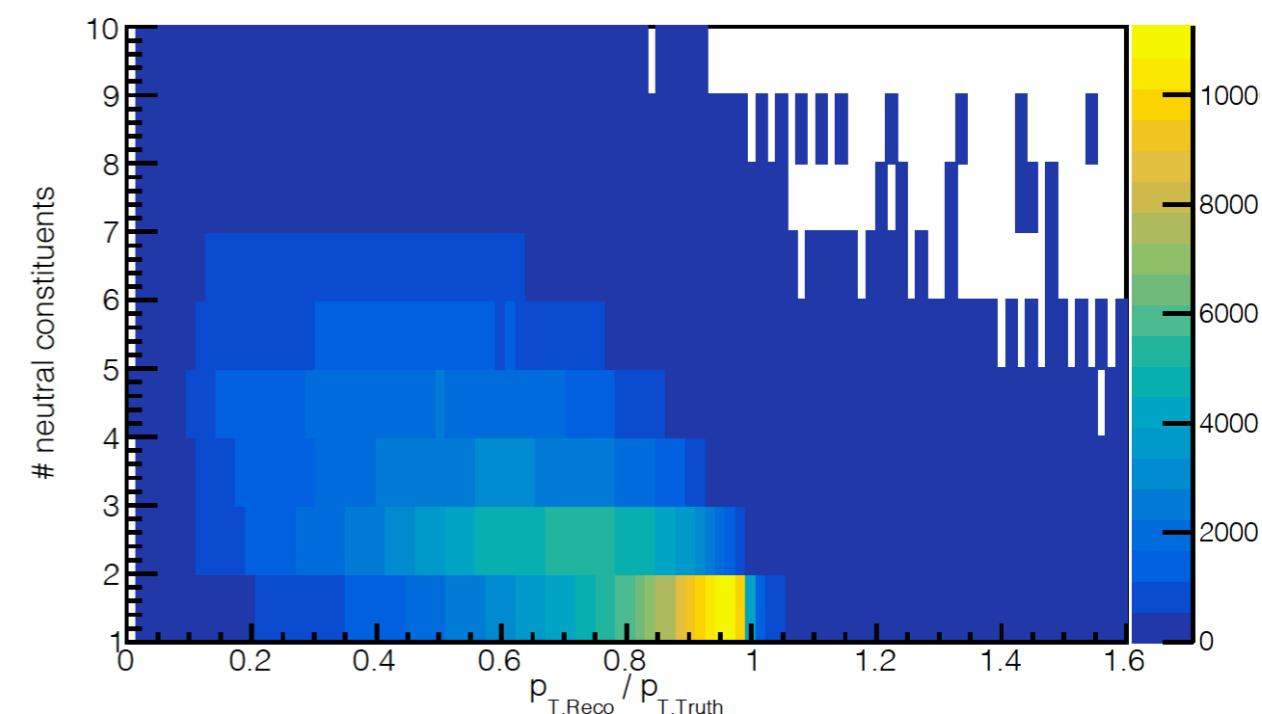
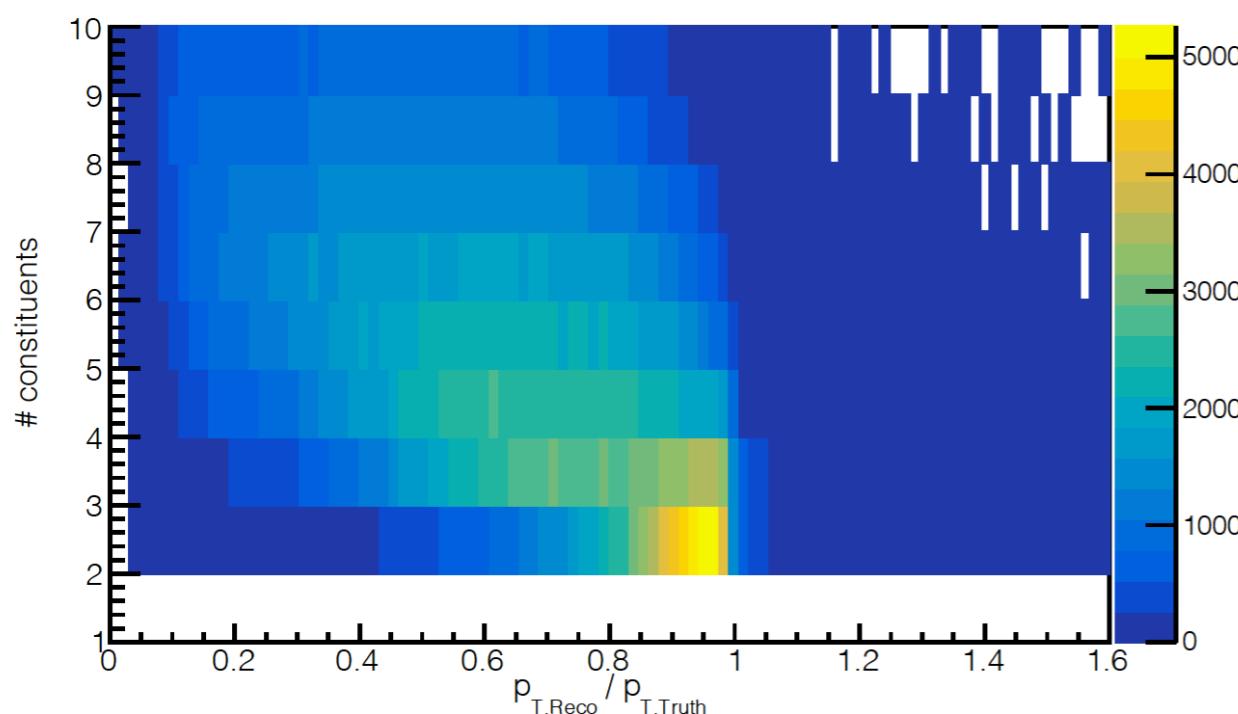
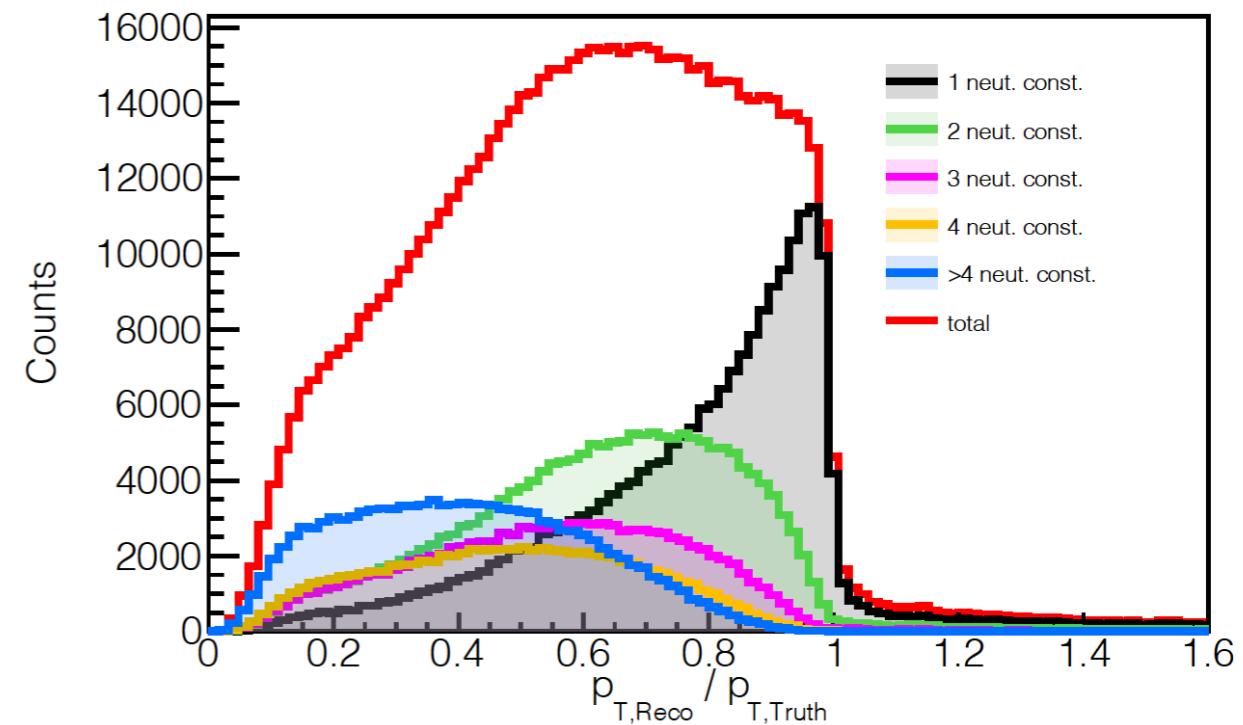


Mixed jets, >1 constituents

all constituents



neutral constituents



Pythia config file

```
Beams:idA = 2212 ! first beam, p = 2212, pbar = -2212
Beams:idB = 11   ! second beam, e = 11, ebar = -11
Beams:eA = 100   ! proton beam 100 GeV/c
Beams:eB = 20    ! electron beam 20 GeV/c
Beams:frameType=2 ! beams are back-to-back, but with different energies
! Settings related to output in init(), next() and stat()
Init:showChangedSettings = on
Main:timesAllowErrors=900000
Next:numberShowInfo = 1      ! print event information n times
! PDF
#PDF:pSet = 7 ! CTEQ6L, NLO alpha_s(M_Z) = 0.1180.
PDF:lepton=off
TimeShower:QEDshowerByL=off
#PDF:useHardNPDFA=on
#PDF:nPDFSetA=3
#PDF:pSet=LHAPDF6:EPPS16nlo_CT14nlo_Pb208

! Process
WeakBosonExchange:ff2ff(t:gmZ)=on
HardQCD:all = on

! PhaseSpace
PhaseSpace:Q2Min=16
SpaceShower:pTmaxMatch=2
! Seed
Random:setSeed = on
Random:seed = 0
```

Jet momentum resolution

